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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 10/615,512
Filing Date: July 07, 2003
Appellant(s): CHUANG ET AL.

Steven W. Smyrski
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 12 October 2007 27 appealing from the Office action mailed 1 May 2007.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

No amendment after final has been filed.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

6,064,517	Chuang et al.	5-2000
5,717,518	Shafer et al.	2-1998
2004/0051957	Liang	3-2004

2001/0040722 Shafer et al. 11-2001

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claims 75, 79-81, 83, 86 and 90 are rejected under 35 U.S.C. 102(b) as being anticipated by Chuang et al., US 6,064,517.

Regarding claims 75, 83 and 86, Chuang et al. disclose in figs. 13 and 17 a system for inspecting a specimen (704) comprising an illumination system (1301) able to provide light energy having a wavelength within a predetermined range; and an imaging subsystem (1702, fig. 17) oriented and configured to receive said light energy from said illumination system (see fig. fig. 13) and direct light energy toward said specimen (704), said imaging subsystem (1702, fig. 17) comprising a plurality of lenses (1708-1716) all aligned along an axis (fig. 17), being free of planar reflecting surfaces (see table in column 20) and having a diameter less than 100 millimeters (as the drawing are to scale, see column 12, lines 28-31, the diameter of the largest lens (1712) is approximately 50 mm); wherein the imaging subsystem is configured to provide a field size in excess of approximately 0.4 millimeters (4 mm, column 19, lines 52-55) at a numerical aperture of approximately 0.90 (.97, column 19, lines 52-55, it is noted that neither the specification nor the claim defines the term "approximately" in any degree of similarity. As such a numerical aperture of .97 is approximately .90) from the illumination system having the wavelength in the range of less than approximately 320 nanometers (column 20, lines 8-9). The method of utilizing the structure of the claim is inherent therein.

Regarding claim 79 and 90, Chuang et al. further disclose where the imaging and illumination subsystems support at least one of a group of inspection modes comprising bright field, ring dark field, directional dark field, full sky, aerial imaging, confocal, and fluorescence (abstract).

Regarding claim 80, Chuang et al. further disclose where the imaging subsystem uses a varifocal system for the full magnification range (fig. 22 and column 23, lines 18-19).

Regarding claim 81, Chuang et al. further disclose where separate imaging lenses are used for specific magnification increments (fig. 22 and column 23, lines 20-21).

Claims 76 and 87 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chuang et al.

Chuang et al. disclose the claimed invention except for explicitly stating the illumination system's wavelength is in the range of approximately 285 to 320 nanometers. However, Chuang et al. does disclose in column 11, lines 36-43, that the objective may be used for light beams having different wavelengths from the infrared to the deep ultraviolet. It would have been obvious to one of ordinary skill in the art at the time the invention was make the wavelength of the illumination system any wavelength from the infrared to the deep ultraviolet, which includes the claimed range, to be able to examine different specimen characteristics under different light conditions.

Claims 1, 6-9, 82, 85 and 91 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chuang et al. in view of Shafer et al., U.S. Patent No. 5,717,518 (henceforth Shafer '518).

Regarding claims 1 and 6-8, Chuang et al. disclose the claimed invention except for explicitly stating the illumination system comprises an arc lamp having a wavelength in the range of less than approximately 320 nanometers. However, Chuang et al. does disclose in column 11, lines 36-43, that the objective may be used for light beams having different wavelengths from the infrared to the deep ultraviolet. Further, Shafer '518 teach in column 4, lines 1-24, that lasers and arc lamps are art-recognized equivalents. It would have been obvious to one of ordinary skill in the art at the time the invention was make the wavelength of the illumination system any wavelength from the infrared to the deep ultraviolet, which includes the claimed range, to be able to examine different specimen characteristics under different light conditions. Further, it would have been obvious to one of ordinary skill in the art at the time the invention was made to replace the illumination system of Chuang with an arc lamp as suggested by Shafer '518, because it is a reliable, commonly available light source.

Regarding claims 9, 82, 85 and 91, Chuang et al. further disclose using the system for detection of particular object faults (column 3, lines 44-45) but does not explicitly state the system further comprising a data analysis subsystem for analyzing data representing the light energy reflected from the specimen, wherein the data analysis subsystem has the ability to record defect position for any defect on the specimen. Shafer '518 teach an imaging system (fig. 6) which includes a data analysis subsystem (92 and 96) for analyzing data representing the light energy reflected from the specimen (column 9, lines 20-26), wherein the data analysis subsystem has the ability to record defect position for any defect on the specimen (into 98). It would have been obvious to one of ordinary skill in the art at the time the invention was made to add the data

analysis subsystem of Shafer '518 to the system of Chuang et al. to be able to analyze and store the images that are detected (Shafer '518, column 9, lines 20-26).

Claims 1, 2, 5, 70, 75-78, 83, 84 and 86-89 are under 35 U.S.C. 103(a) as being unpatentable over Liang, US 2004/0051957 A1 in view of Shafer et al., US 2001/0040722 A1, (henceforth Shafer '722).

Liang discloses a microscope objective including an imaging system (see, e.g. figs. 4-8) comprising a plurality of lenses (e.g., 32-38; fig. 8) all aligned along an axis (figs. 4-8), being free of planar reflecting surfaces (e.g., table 4) and having a diameter less than 100 millimeters (e.g., table 4); wherein the imaging subsystem is configured to provide a field size in excess of approximately 0.4 millimeters (see at least page 2, section [0010] and claim 2) at a numerical aperture of approximately 0.90 (see at least page 2, section [0010] and claim 1) from the illumination system having the wavelength in the range of less than approximately 320 nanometers (page 6, section [0073]). Liang does not explicitly state that the objective is part of a system for inspecting a specimen including an illumination comprising an arc lamp having a wavelength in the range of less than approximately 320 nanometers. Further, Liang lacks the plurality of elements comprising a Mangin mirror arrangement or collection optics for collecting light energy reflected from said specimen, wherein the collection optics are catadioptric, and catadioptric optics support wavelengths from approximately 266-600 nm. Shafer '722 teaches figs. 1 and 3, a system (fig. 1) for inspecting a specimen comprising: an illumination system (101) comprising an arc light able to provide light energy having a wavelength in the range of approximately 285 to 320 nanometers (see page 4, section [0056]); and an imaging subsystem

(fig. 3) oriented and configured to receive said light energy from said illumination system and direct light energy toward said specimen, said imaging subsystem comprising a plurality of elements having a diameter less than 100 millimeters (as the drawing is to scale, all elements are less than 100 millimeters), wherein said plurality of optical elements also comprises a Mangin mirror arrangement (306) and collection optics (102) for collecting light energy reflected from said specimen (fig. 1), wherein the collection optics are catadioptric (102 and fig. 3); and wherein the catadioptric optics support wavelengths from approximately 266-600 nm (in at least so far as this wavelength range will pass through the optics). First, it would have been obvious to one of ordinary skill in the art at the time the invention was made to add an illumination system including an arc lamp as taught by Shafer '722 to provide a well known microscope system to investigate samples. Further, it would have been obvious to one of ordinary skill in the art at the time the invention was made to add a margin mirror/catadioptric collection optic as taught by Shafer '722 to the system to correct/prevent/minimize chromatic aberrations (Shafer '722, page 6, section [0082]).

(10) Response to Argument

The appellant argues that the imaging subsystem as claimed is broader than simply the focusing group 1702 of Chuang because the imaging subsystem must direct light energy toward said specimen and therefore must include the Mangin mirror element 1706 which is larger than the claimed 100 mm diameter (see pages 10-11, section A of the brief). The examiner respectfully disagrees. The focusing group of Chuang (1702, fig. 17) is clearly an imaging subsystem (focuses the light to form an image at 1707, see fig. 17) and includes a plurality of

lenses (1708-1716) and directs light energy toward said specimen (704, see fig. 17). These lenses (1708-1716) alone meet all the requirements of the imaging subsystem as claimed. Thus, reliance upon the Chaung et al. reference is appropriate. .

In response to appellant's argument that the examiner's conclusion of obviousness is based upon improper hindsight reasoning (see page 14, paragraph 1 of the brief), it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971).

In response to appellant's argument that simply plugging in an arc lamp into the Chuang design may not work (see page 14, paragraph 1 of the brief), the test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981).

Appellant further argues that the examiner has not pointed to any cogent supportable reason that would lead an artisan of ordinary skill in the art to come up with the claimed invention but provided mere conclusory statements (see pages 13-16, section B of the brief). The examiner respectfully disagrees. The rationales provided in the rejection clearly detail why one of ordinary skill would be motivated to make the combination and are therefore not mere

conclusory statements. For example, arc lamps are taught by Shafer '518 to provide the same output as the lasers used in Chaung so one of ordinary skill would be motivated to use an arc lamp instead of a laser because arc lamps are a commonly available, known, reliable light source.

The appellant additionally argues that the Liang reference provides no support for its disclosed/claimed field of view range of "substantially 220-240 μm or more" actually being more than 240 μm (see section C, pages 16-20 of the brief). MPEP 2131.03 states:

> When the prior art discloses a range which touches or overlaps the claimed range, but no specific examples falling within the claimed range are disclosed, a case by case determination must be made as to anticipation. In order to anticipate the claims, the claimed subject matter must be disclosed in the reference with "sufficient specificity to constitute an anticipation under the statute." What constitutes a "sufficient specificity" is fact dependent.

It is the examiner's position that Liang has provided sufficient specificity to determine a field of view (FOV) in the claimed range of "in excess of approximately 0.4 millimeters." First, Liang claims the FOV range to be substantially 220-240 μm or more (see at least page 2, section [0010] and claim 2) and the outer diameter to be substantially 1.6-2.0 mm or less. Second, Liang provides that magnification (m) of the objective is between 1 and 12 and preferably greater that 4 (see at least the abstract). Finally, equation 0.4 (see page 4, 1st column) provides that the m (upper limit) ≈ 1.06875OD/FOV. If you solve the equation for FOV, it becomes FOV= 1.06875 * OD/m. Using a magnification of 4 and the OD of 2 mm as allowed by the specification than the FOV will be .534375 mm which meets the claimed range. Therefore Liang provides sufficient specificity to determine a field of view (FOV) in the claimed range of "in excess of approximately 0.4 millimeters and the rejection is appropriate.

The appellant again argues that the examiner's conclusion of obviousness is based upon improper hindsight reasoning (see pages 20-21 of the brief), it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971). It is specifically noted that the reasoning to correct/prevent/minimize chromatic aberrations was not taken from the appellant's disclosure but from the prior art, specifically Shafer '722, page 6, section [0082] as stated in the rejection.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

Lee Fineman

Stephone B. Allen
Supervisory Patent Examiner

Conferees:

Stephone B. Allen

Ricky Mack